

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)	
)	
Expanding Flexible Use in Mid-Band)	GN Docket No. 17-183
Spectrum Between 3.7 and 24 GHz)	

To: The Commission

**REPLY COMMENTS OF
THE OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA
AND PUBLIC KNOWLEDGE**

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The Open Technology Institute at New America and Public Knowledge (“OTI & PK”) hereby submits its Reply Comments in response to certain of the Comments filed in the above-captioned Notice of Inquiry (“*Mid-Band NOI*”).¹

I. Introduction and Summary

OTI & PK urge the Commission to expeditiously issue a Notice of Proposed Rulemaking (“NPRM”) to authorize the deployment of high-capacity, fixed wireless broadband services (point-to-multipoint) in the 3.7-4.2 GHz Band and a separate NPRM to authorize an unlicensed underlay across the entire 6 GHz band (5925 – 7125 GHz). With respect to the 4 GHz band we make four key points:

First, the Commission should explicitly rescind the antiquated policy that permits registered FSS earth stations to coordinate and reserve – and, thereby, receive interference protection for – “full band, full arc” operations over the entire 500 megahertz of the downlink C-Band, even though any given earth station typically uses only a small portion of the band. The

¹ *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, GN Docket No. 17-183, FCC 17-104 (rel. Aug. 3, 2017). Comments referenced below were filed on or before October 2, 2017 in GN Docket No. 17-183.

Commission should modify its policy to clarify that earth station registrations provide priority access and interference protection only for the specific frequencies (and orbital slots) on which satellite earth stations are actually operating. The pending Petition for Rulemaking filed by the Broadband Access Coalition (of which OTI & PK are members) anticipates the need for FSS incumbents to switch transponders and frequencies, if needed, and proposes both an automated database coordination mechanism and a band-wide operability requirement for terrestrial equipment certified for use on the band.²

Second, we note there is overwhelming support in the record for a NPRM based on the BAC Petition's proposal to amend and modernize Parts 25 and 101 of the Commission's Rules to authorize P2MP fixed wireless deployments on locally-vacant spectrum to provide high-capacity broadband service in rural, unserved and underserved areas.³ FSS operators would receive full protection from harmful interference for any and all current or future operations. A spectrum sharing policy that immediately enables wide-channel P2MP fixed service on spectrum with mid-band propagation characteristics will make high-capacity broadband in rural and other less densely populated areas feasible much sooner and at far lower costs than relying on wireline deployments. Access to wide channels of mid-band spectrum available for P2MP deployment will spur private sector investment in advanced broadband networks serving rural and other underserved communities.

Third, there is strong support for the view that the Commission can immediately authorize the use of Part 101 coordination for P2MP fixed wireless deployments without

² Petition for Rulemaking of the Broadband Access Coalition, RM-11791 (filed June 21, 2017) (hereinafter "BAC Petition").

³ *Ibid.*

foreclosing either the concurrent or future use of the band for CMRS deployments. OTI & PK agree with commenters who support truly flexible use, allowing for a market-demand-driven coordination of actual deployments by fixed *and* mobile operators on a localized basis. Just as the adjacent CBRS band leverages a combination of database management, a relatively low transmit power limit, and a band-wide operability requirement to facilitate *both* fixed and mobile deployments, these same techniques can be combined to quickly unleash the fallow spectrum capacity of the 3.7-4.2 GHz band for high-capacity fixed wireless (primarily in low-population-density areas) and capacity-enhancing mobile access points (primarily in core urban other high-traffic areas).

Fourth, there is a strong consensus in the record that FSS licensees operating in the 3.7-4.2 GHz band should be required to update the IBFS database as soon as feasible so that the Commission can determine which earth station licenses are still active and ensure their protection from interference. An updating of IBFS will also benefit FSS incumbents by ensuring that *unregistered* earth stations are protected from harmful interference.

Finally, OTI & PK strongly support the broad consensus in the record that the Commission should expeditiously issue a NPRM to develop service and technical rules that authorize unlicensed broadband operations across the entire 6 GHz band (5925 to 7125 MHz). The breadth of the 6 GHz industry coalition in support of extending unlicensed access, both indoors and outdoors, from 5925 MHz up to 7125 MHz, is a testament to the critical role that unlicensed technologies – and Wi-Fi in particular – plays in our economy and society more generally. Our groups further recommend that even if a database management mechanism is necessary to ensure the protection of band incumbents from unlicensed operations outdoors, that the Commission bifurcate the NPRM to more quickly authorize the use of Part 15 Wi-Fi and

other low-power unlicensed technologies indoors, which can be safeguarded with an AC power requirement if needed.

II. The Record Supports a Notice of Proposed Rulemaking to Expand Shared Access to Fallow Spectrum in the 3.7-4.2 GHz Band

OTI & PK urge the Commission to expeditiously issue an NPRM to authorize the deployment of high-capacity, P2MP fixed wireless broadband services in the 3.7-4.2 GHz band. The rapid deployment of high-capacity P2MP access points will help to address the digital divide by enabling more affordable, near-gigabit fixed wireless broadband service to rural and other underserved areas, as well as more competition in other areas where consumers have little if a choice among fixed broadband providers. The current Part 101 coordination process can immediately allow both fixed and mobile terrestrial wireless deployments on fallow C-Band spectrum in local areas, particularly since mobile operators will be focused on enhancing capacity in targeted (mostly) urban and high-traffic areas, while fixed P2MP providers will be focused on rural and other less densely populated areas.

A. Enormous Unused Capacity for Terrestrial Broadband Can be Unlocked by Ending the ‘Full Band, Full Arc’ FSS Reservation Policy

Registered FSS earth stations are permitted to coordinate and reserve – and thus, receive interference protection for – “full band, full arc” operations, an antiquated ITU policy that has never been expressly adopted by the Commission. That is, FSS earth stations are routinely licensed to use all 500 megahertz across the entire 3700 – 4200 MHz band, even though any

given earth station typically uses only a small portion of the band.⁴ There is strong support in the record for the view that “full-band, full-arc” coordination must not continue, since it effectively warehouses spectrum that could be shared using an advanced version of the Part 101 coordination process that currently protects FSS operators from harmful interference.

Although FSS incumbents opine that they *may* need access to currently unused portions of the band in the future, there is little dispute that currently more than 90 percent of the band’s spectral capacity lies fallow. For example, the BAC Petition notes that while 975 receive-only C-Band earth stations licensed to the Associated Press reserve the entire 3700-4200 MHz range of spectrum, AP’s website indicates that it uses only a single, 23-megahertz satellite transponder for each of these earth stations.”⁵ This means that as much as 467 megahertz of spectrum is likely not in use in the area around AP’s earth stations. And assuming that AP registers its earth stations, as required, these 975 receive-only stations represent nearly one-fourth of the total number of registered earth stations nationwide.

Another example is National Public Radio. On November 8 NPR filed an *ex parte* NPR stating that its “system depends . . . [on] 475 total public radio earth stations” that use four FSS transponders that transmit between 3702 – 3858 MHz.⁶ That means NPR is using a maximum of

⁴ In stark contrast, Canadian earth stations seeking to coordinate with terrestrial FS stations in the United States provide more detailed information, including the specific transmit and receive frequencies, the antenna azimuth and elevation angles, and the orbital location of the satellite. The BAC Petition requested that FSS operators provide the same information to IBFS. *See, e.g.*, Public Notice, Request for Coordination of Canadian Earth Stations with USA Terrestrial Fixed Stations, Report No. SPB-268, (rel. March 29, 2017).

⁵ BAC Petition at 23 & n. 42. The NOI notes that geostationary orbit FSS satellites “typically have 24 transponders, each with a bandwidth of 36 megahertz received by one or more earth stations.” NOI at ¶ 14.

⁶ National Public Radio, *Ex Parte* Letter to Marlene H. Dortch, FCC, *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, GN Docket No. 17-183 (Nov. 8, 2017).

160 MHz (including guard bands) in each of the 475 communities where it has registered a FSS earth station. This means that as much as 340 contiguous megahertz of fallow spectrum is potentially available in the area around every NPR earth station, unless of course some other earth station close by is using the upper two-thirds of the band.

There is also overwhelming evidence that many of the licensed FSS earth stations were never built, no longer exist, or operate at locations far removed from those for which they were licensed. These “ghost” earth stations further exacerbate the preclusive effect of “full band, full arc” coordination and licensing. Google Earth imagery shows that approximately 29% of IBFS-registered C-band FSS locations are actually not in use for satellite services, despite being registered in IBFS.⁷ In fact, 29% is a low estimate, since this does not include inactive dishes that remain in place.⁸ Studies and filings by the Fixed Wireless Communications Coalition (FWCC) have reported similar findings.⁹

OTI & PK agree strongly with Microsoft, which states that the “root of [this] inefficiency is the existing ‘full band, full arc’ coordination policy” and that the FCC should “update its rules regarding FSS earth station so that they are protected only to the extent necessary to protect them from receiving harmful interference.”¹⁰ Similarly, the Dynamic Spectrum Alliance (“DSA”) expressed strong support for opening this band for shared use, recognizing that “most of the band’s 500 megahertz of capacity lies fallow in most local areas across the country” because

⁷ Comments of Google at 4.

⁸ *Id.* “It can confidently be said that approximately one-third of IBFS-registered C-band FSS sites *or more* do not require protection because they either do not exist or are not in operation.” *Id.* at 5.

⁹ FWCC Letter to FCC, Request for an Audit of Licensed Satellite Earth Stations in Bands Shared with the Terrestrial Fixed Service, Sept. 30, 2016 at 3. FWCC has requested an audit of FSS earth stations in June 2002, February 2004, November 2008, and September 2016. *See id.* at 1-2 and n. 2.

¹⁰ Comments of Microsoft at 3.

full-band, full-arc “reservations for FSS earth stations excessively protect earth stations in not just the frequencies they use, but across the entire band and at all elevation levels.”¹¹ DSA concluded that “[o]ld approaches to spectrum management, based largely on band clearing and exclusive licensing, are ill-equipped to deliver” connectivity in timely fashion to meet existing service needs within the next few years.¹²

Federated Wireless correctly notes that in addition to full-band reservation, sharing of unused spectrum in this C-Band downlink band is also unnecessarily constrained by the related (and excessive) ITU protection distance. FSS sites require a 150-kilometer protection zone and that no wireless operations may take place within those protection zones unless first coordinated with the FSS licensee.¹³ Federated notes that when the Commission considered the appropriate protection for earth stations in the context of its CBRN Order, the agency found those protection zones to be “excessively large, overly simplistic, and inefficient given the capabilities of SASs to predict realistic path loss.”¹⁴ OTI & PK agree with Federated that any NPRM intended to expand access to unused spectrum between 3700 and 4200 MHz must test and reconsider what protections zones are necessary and take into consideration actual terrain and other local features (e.g., buildings) that operate to shield earth stations from terrestrial access points.

FSS incumbents – including the primary satellite providers (Intelsat and SES) and their customers (content producers, MVPDs and broadcasters) – generally oppose an end to full-band,

¹¹ *Id.* at 5-6.

¹² *Id.* at 22.

¹³ *See* 47 C.F.R. § 90.1331.

¹⁴ Comments of Federated Wireless at 6, citing *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959 (2015), at ¶ 288.

full-arc reservations. They argue that earth stations must have the ability to switch to a different transponder, or to a different satellite, to facilitate both service restoration and competition. According to the American Cable Association (ACA), without full-band coordination, receive-only earth stations would be locked into their current frequency bands (and satellite transponders), thereby limiting their ability to switch to different transponders (whether due to outage or for competitive reasons), or to add transponders.¹⁵

Incumbent FSS operators make a valid point: *If* the Commission decides that FSS earth stations will continue operating between 3.7 and 4.2 GHz, then incumbents may need to retain the flexibility to switch transponders and/or add a transponder. This could, in turn, require the use of a previously vacant portion of the band that has become occupied by a new terrestrial licensee (whether fixed or mobile). However, the frequency agility of new arrivals on shared bands to protect incumbents is nothing new and could be made a condition of co-primary coordination.

The BAC Petition anticipated the need for FSS incumbents to switch transponders and frequencies, if needed, and proposed both an automated database coordination mechanism and a band-wide operability requirement for terrestrial equipment certified for use on the band. Similarly, Google in its comments proposed an automated but “lightweight” database authorization system that “would modernize the manual coordination process that is now codified in Part 101 of the Commission’s rules.”¹⁶ The Commission already requires both of

¹⁵ Comments of the American Cable Association at 18-19.

¹⁶ Comments of Google at 9. *Accord* Comments of Broadband Access Coalition at 4 (hereinafter “BAC”) (proposing to use and automate the existing Part 101 coordination process); Comments of Frontier Communications Corp., Windstream Services, LLC, and Consolidated Communications, Inc. at 7-8 (“the BAC proposal builds on a well-understood, existing framework, Part 101, and [would] make the framework readily updateable, whether through a future electronic coordination system or a spectrum

these sharing mechanisms (band-wide operability and a geolocation database) as a condition for any non-federal user to operate in the adjacent 3550-3700 MHz as part of the new Citizens Broadband Radio Service (CBRS). Introducing a similar requirement in the 3.7-4.2 GHz band to protect FSS incumbents would be less complex than CBRS due to the static nature of FSS and fixed wireless incumbents in the band.

Finally, it's notable that even parties that represent earth station licensees that rely on the transmission services of the incumbent FSS operators recognized that a new mechanism for spectrum sharing in these frequencies would yield substantial public interest benefits, provided that adequate safeguards are adopted to protect existing FSS operations. The American Cable Association, for example, affirmatively "Welcomes More Intensive Use of the Band, with Appropriate Safeguards."¹⁷ Both Charter Communications and the National Cable Television Association similarly did not reject spectrum sharing, but urged the Commission to ensure the existing users are protected from harmful interference.¹⁸

In sum, the Commission should modify its policy to clarify that earth station registrations provide priority access and interference protection only for the specific frequencies (and orbital slots) on which satellite earth stations are actually operating. In combination with a wholesale updating of the International Bureau Filing System – including the registration of many non-registered receive-only stations – the band can be safely opened to substantial additional use in the public interest.

access"); Comments of Microsoft at 9 ("the Commission should require the [Part 101] coordination process to be automated through a database in relatively short order after the new service is authorized through a multi-stakeholder process").

¹⁷ Comments of the American Cable Association at 19.

¹⁸ See Comments of Charter Communications, Inc. at 3 - 4; Comments of NCTA – The Internet & Television Association at 4.

B. Opening Vacant Mid-Band Spectrum for P2MP Fixed Wireless Service Will Enable High-Capacity and More Affordable Broadband Access In Rural and Other Currently Unserved And Underserved Areas

OTI & PK are among the founding members of an increasingly large and diverse Broadband Access Coalition (“BAC”) seeking access to vacant mid-band spectrum in the underutilized 3700 – 4200 MHz band to facilitate a new, licensed fixed wireless point-to-multipoint (“P2MP”) high-speed broadband service on a shared basis. The BAC’s pending Petition for Rulemaking (“Petition”) proposes to amend and modernize Parts 25 and 101 of the Commission’s Rules to authorize P2MP fixed wireless broadband service in rural, unserved and underserved areas in a manner that would protect FSS incumbents and enable multiple providers to offer competitive gigabit or near-gigabit fixed broadband service.¹⁹ Under the Coalition’s proposals, FSS operators would receive full protection from harmful interference from terrestrial operators for any and all current operations. A large number of commenters representing a wide range of interests voiced strong support either for the BAC proposal itself or for the general spectrum allocation approach that it advances as the most appropriate model for new spectrum sharing in the 3.7-4.2 GHz Band.

The Commission has found that approximately 34 million Americans lack access to broadband speeds that meet the requirements of advanced communications, and that more than two-thirds of these citizens reside in rural areas.²⁰ In rural and tribal areas specifically, more than two-thirds of the population (23 million people) lack access to this necessary level of

¹⁹ Petition for Rulemaking of the Broadband Access Coalition, RM-11791 (filed June 21, 2017).

²⁰ See Petition at 9, citing *2016 Broadband Progress Report*, 31 FCC Rcd 699, 731 (2016).

internet connectivity.²¹ On Tribal lands, approximately 41 percent lack access to 25/3 Mbps broadband service, and 68 percent in rural Tribal lands lack such access.²² Our nation's schools and libraries face a similar connectivity gap. Over 40 percent of schools and 47 percent of students do not receive broadband services that meet the Commission's short-term goal of 100 Mbps per 1,000 users.²³ This explains, in part, why the American Library Association, the Schools, Health, Library Broadband coalition (SHLBC), and Consumer Federation of America were also among the founding members of BAC.

Competition and choice among high-capacity broadband providers is also lagging, particularly in less densely populated areas outside central cities. The Commission's data indicates that only 42 percent of developed census blocks in the U.S. have access to more than one provider offering fixed broadband speeds of at least 25/3 Mbps, and only 12 percent of developed census blocks in the U.S. have access to more than one provider offering fixed broadband speeds of at least 100 /10 Mbps.²⁴ Modernizing the Part 25 and Part 101 rules to enable licensed P2MP deployment would provide vital spectrum resources to address this critical shortfall in broadband access and competition, greatly advancing the Commission's long-term

²¹ See *id.*, citing *2016 Broadband Progress Report* at 731 – 732 (¶ 79). According to the Commission's 2016 *Report*, 5% of all Americans lack access to fixed broadband service at even 4/1 Mbps, 6% lack access to 10/1 Mbps service, and 39% of rural Americans (23 million people) lack access to 25/3 Mbps service.

²² See *id.* at 732.

²³ *Id.* at 741.

²⁴ See "Internet Access Services: Status as of June 30, 2016," Industry Analysis and Technology Division, Wireline Competition Bureau (April 2017) ("*2016 Internet Access Report*"), at Figure 4. Figure 4 shows that 58 percent of developed census blocks have access to one or fewer service providers offering broadband speeds of 25/3 Mbps and 88 percent of developed census blocks have access to one or fewer service providers offering broadband speeds of 100/10 Mbps. Further, Figure 4 *overstates* the level of competition because "a provider that reports offering service in a particular census block may not offer service, or service at that speed, to all locations in the census block." *Id.* at 6.

and continuing efforts to close the digital divide, particularly in rural and other underserved areas.²⁵

As the BAC Petition describes in greater detail, enabling wide-channel P2MP fixed service on spectrum with mid-band propagation characteristics will make high-capacity broadband in rural and other less densely populated areas feasible much sooner and at far lower costs than relying on wireline deployments. Access to wide channels of mid-band spectrum available for P2MP deployment will spur private sector investment in advanced broadband networks serving rural and other underserved communities. The Commission can almost immediately unleash this “spectrum as infrastructure” to address the rural broadband divide at no cost to the Treasury. By authorizing access to *vacant* spectrum between 3.7-4.2 GHz, the Commission can substantially lower the cost of high-capacity broadband deployment without increasing public subsidies paid from the Connect America Fund and other programs. With mid-band spectrum as infrastructure, operators receiving universal service funds will be able to accomplish the goals of the Commission sooner and more cost effectively, which is why most of them support the BAC Petition.

Indeed, more than 100 comments supporting the Petition (in the RM-11791 docket) and in this proceeding show strong support for this proposal. For example, both smaller rural operators (e.g., hundreds of ISPs represented by BAC members WISPA, NTCA—The Rural Wireless Assn. and Rural Wireless Assn.) and large incumbent rural carriers, including Frontier, Windstream and Consolidated, expressed specific support for moving forward with a rulemaking proceeding

²⁵ See, e.g., “A Digital Empowerment Agenda,” Remarks of FCC Commissioner Ajit Pai at The Branderly, Cincinnati, Ohio (rel. Sept. 13, 2016).

based on the Petition’s proposal to use Part 101 coordination to unlock vacant mid-band spectrum for rural broadband.²⁶

Frontier, Windstream and Consolidated noted that their “companies have collectively committed to bring speeds of 10/1 Mbps or faster to nearly 1.3 million households and businesses (covering an estimated 2.6 million rural Americans) by year-end 2020.”²⁷ The three LECs went on to argue that “the [BAC] proposal builds on a well-understood, existing framework, Part 101, and appears to make the framework readily updateable,” concluding that the Coalition’s “proposal offers a straightforward path to unleashing this spectrum, and it may be the best way to start ensuring this spectrum starts paying dividends to rural America.”²⁸

We agree with CenturyLink that cost-effective last-mile wireless connectivity is essential to broadband deployment because ubiquitous fiber deployment is not financially feasible due to a

²⁶ *See, generally*, Comments of Frontier Communications Corporation, Windstream Services, LLC, and Consolidated Communications, Inc. (“Comments of Frontier, et al.”); Comments of Rise Broadband, RM-11791 (filed Aug. 3, 2017); Comments of Cal.net, Inc., RM-11791 (filed Aug. 7, 2017) ; Comments of All Points Broadband, RM-11791 (filed Aug. 7, 2017); Comments of Broadband VI, LLC, RM-11791 (filed Aug. 7, 2017); Comments of ProValue.net, RM-11791 (filed Aug. 7, 2017); Comments of Hudson Valley Wireless, RM-11791 (filed Aug. 7, 2017); Comments of Joink, Inc., RM-11791 (filed Aug. 1, 2017); Comments of Highspeedlink, RM-11791 (filed Aug. 3, 2017); Comments of Southern Ohio Communication Services, Inc., RM-11791 (filed Aug. 2, 2017); Comments of Vertical Broadband, RM-11791 (filed Aug. 7, 2017); Comments of Quantum Links Networks LLC, RM-11791 (filed Aug. 1, 2017); Comments of Slopeside Internet, RM-11791 (filed Aug. 7, 2017) (the proposed rules “can also be a solution to the huge gulf that exists economically between rural and urban settings”); Comments of NGL Connection, RM-11791 (filed Aug. 7, 2017), at 2 (“the larger companies will continue to offer their services to the urban and suburban areas, continuing to ignore the much needed access to wireless services in rural areas. The rural areas will never grow population centers necessary for the large companies to fully invest. That is why smaller companies specialize in this targeted market”). *See also* Comments of the National Spectrum Managers Association, RM-11791 (filed Aug. 7, 2017), at 5; Comments of the Fixed Wireless Communications Coalition, RM-11791 (filed Aug. 7, 2017) (“FWCC Comments”), at 2; Comments of the Utilities Telecom Council, RM-11791 (filed Aug. 7, 2017), at 2, 5.

²⁷ Comments of Frontier, et al. at 3.

²⁸ *Id.* at 7 - 8. *See also* Comments of NetMoby, Inc. at 1 n.2 (we “fully support the proposal and efforts of the Broadband Access Coalition (“BAC”) to fully maximize the efficient use of the 3700 - 4200 MHz spectrum”).

variety of factors, including insufficient population density.²⁹ Fixed wireless P2MP service can be deployed for a much lower cost per home served in less densely populated areas. As the Dynamic Spectrum Alliance noted, the Coalition’s proposal would facilitate “use of the fallow spectrum in the band to improve broadband service across the country, especially in rural and other underserved areas where high-capacity wireline service is too costly to deploy or where consumers lack a competitive alternative.”³⁰ Access to 40, 80 and even 160 megahertz of contiguous, vacant mid-band spectrum will enable rural carriers, WISPs and other operators to deploy cost-effective broadband at gigabit and near-gigabit speeds that are simply not feasible (or at least not affordable) by relying on trenched fiber or other options.

Rural broadband providers, equipment makers, and consumer, school and library groups are not the only parties in the record supporting coordinated, shared use of the 3.7-4.2 GHz band to enable high-capacity P2MP fixed wireless for rural America. In its comments, Microsoft generally endorses the BAC proposal and urges the Commission to issue a NPRM “to authorize a new licensed fixed [P2MP] wireless service in the 3.8-4.2 GHz frequency band” since it “offers the potential to be part of the last-mile broadband access solution in less densely populated areas.”³¹

Google – which also filed as a member of the Intel-led Mid-Band Spectrum Coalition – argued that “modifying the Part 101 rules to enable deployment of [P2MP fixed wireless] systems in the 3.7-4.2 GHz band would bring service benefits comparatively quickly and easily”

²⁹ See, e.g., Comments of CenturyLink, Inc. at 2 (“in more rural areas of the country ... traditional wireline facilities are exceedingly difficult or expensive to place”).

³⁰ Comments of DSA at 9 - 10.

³¹ Comments of Microsoft at 7. “Microsoft agrees with the overall contour of the Broadband Access Coalition (BAC) petition to the Commission but differs on a number of the details.” *Id.* at 8.

and “would not preclude use of the band for mobile broadband in the future.”³² OTI & PK discuss the Commission’s ability to accommodate both fixed and mobile use of vacant spectrum, on a coordinated and localized basis, in the next section.

C. An Automated Part 101 Coordination Database and Band-Wide Operability Requirement Can Accommodate Shared Access by Both Fixed *and* Mobile Operators

There seems to be an unfortunate (and fallacious) assumption among some parties that if the Commission decides to expand shared use of the 3.7-4.2 GHz band for wireless broadband, that it must adopt an industrial policy that dictates a choice between fixed or for mobile use. This is a false choice.

OTI & PK agree with commenters who support truly flexible use, allowing for a market-demand-driven coordination of actual deployments by fixed *and* mobile operators on a localized basis. Just as the adjacent CBRS band leverages a combination of database management, a relatively low transmit power limit, and a band-wide operability requirement to facilitate *both* fixed and mobile deployments, these same techniques can be combined to quickly unleash the fallow spectrum capacity of the 3.7-4.2 GHz band for high-capacity fixed wireless (primarily in low-population-density areas) and capacity-enhancing mobile access points (primarily in core urban other high-traffic areas).

Our groups strongly agree with Google, Frontier, et al., the Broadband Access Coalition, Microsoft, CompTIA, Federated Wireless and other parties that the Commission can immediately authorize the use of Part 101 coordination for P2MP fixed wireless deployments without foreclosing either the concurrent or future use of the band for CMRS deployments. As

³² Comments of Google LLC and Alphabet Access at 11 (hereinafter “Google”).

in the adjacent CBRS band, if fixed P2MP operators are frequency agile and governed by an automated Part 101 geolocation database, the reallocation of a portion of the band to mobile or any other service (e.g., 3700-3800 MHz) could be accommodated as necessary.

Google argues that, as a practical matter, widespread and short-term use of 3.7–4.2 GHz for mobile broadband is “currently much more challenging than fixed use” and “would most likely require decommissioning FSS earth stations in the mobile service area or shifting them to other bands to ensure that mobile devices can operate widely.”³³ Nevertheless, Google observes that because fixed wireless could only be coordinated in areas (or on frequencies) free of FSS operations – and because of the large amount of spectrum overall (500 megahertz) – “large blocks of frequencies and territory would remain unused” and “become available upon the removal of FSS operations.” Moreover, Google states, the BAC proposal would ensure that devices are “interoperable over the entire [3.7-4.2 GHz] band. This rule would ensure that such equipment will be capable of reconfiguration to adapt to any other future uses the FCC may permit in the band.”³⁴

For the foreseeable future, the 3.7-4.2 GHz band is neither needed nor available as coverage spectrum for traditional, very wide-area mobile carrier networks due to the need to clear thousands of FSS earth stations, a majority of which are in cities. Looking forward to the reality of a 5G ecosystem, mobile carriers will not use spectrum above 3.5 GHz to extend the coverage of their networks, but solely to enhance the capacity of their networks in targeted high-traffic areas. This distinction between *spectrum for coverage* (which fits the traditional cellular

³³ Comments of Google at 11.

³⁴ Reply Comments of Alphabet Access, Petition for Rulemaking of the Broadband Access Coalition, RM-11791 (Aug. 22, 2017).

licensing model) and *spectrum for capacity* in localized areas (which is the rationale for the PAL licensing scheme) is critical.

The “5G” wireless ecosystem, just like the present 4G wireless ecosystem, will rely on a combination of centralized carrier networks (that are truly ‘mobile’) and a far larger number of complementary, high-capacity and customized networks deployed by individual business firms, property managers and individual households to meet their particular needs at a lower cost. Today Wi-Fi, deployed at the edge, makes mobile data more fast and affordable. In a 5G world, private, indoor and customized small cell networks using LTE and possibly other technologies will further enhance the ecosystem.

This distinction between spectrum for coverage (traditional cellular networks) and spectrum for capacity (small cells, whether LTE or Wi-Fi) is even more relevant for 5G when we consider that an increasing share of mobile device data traffic (currently over 80 percent) is consumed indoors, on a nomadic and not mobile basis. The benefits of “5G” – high throughput, low latency, and the ability to connect hundreds of different devices and sensors in a local area (e.g., IoT) – will be relevant almost entirely to *indoor* and *high-traffic* areas. Indoors – as well as on corporate, school and other campuses – three of the ingredients most essential to traditional cellular networks (backhaul, power and siting) will be entirely under the control of the property owner. The missing ingredient is spectrum access. Like CBRS, the adjacent C-Band (3.7-4.2 GHz) provides an opportunity for small and rural operators, individual venues, and neutral host and private LTE deployments (e.g., customized IoT) to coordinate actual and localized deployments of wireless access points for *both* fixed *and* mobile services, as market demand (rather than FCC industrial policy) dictates.

Even if the Commission gives no weight to the public interest in provisioning mid-band and wide-channel spectrum for fixed P2MP to address the rural broadband gap, the agency should still conclude that a 5G wireless ecosystem will be more flexible and robust if there is open, flexible and diverse access to 3.7-4.2 GHz spectrum for operators, businesses and venues for more localized and customized local area networks. The benefits of 5G, particularly for mobile carriers, will depend on spectrum aggregation that relies on shared bands to add capacity in high-demand local areas as needed. As Federated Wireless observed in its comments, Qualcomm has recently noted that its 5G New Radio (“NR”) will be a platform for shared spectrum and the applications it supports. As Qualcomm explains,

Access to shared and unlicensed spectrum will extend 5G in multiple dimensions - such as more capacity, higher spectrum utilization, new deployment scenarios. It will benefit mobile operators with licensed spectrum but also opens the doors to those without licensed spectrum – such as cable operators, enterprise or IoT verticals – to take advantage of the 5G New Radio (5G NR) family of technologies. 5G NR is designed to natively support all spectrum types and, through forward compatibility, has the flexibility to take advantage of new spectrum sharing paradigms.³⁵

We fully agree with Federated Wireless that an automated geolocation database solution for 3.7-4.2 GHz “is the best—and only—path to enabling flexible fixed *and* mobile use of the band by the end of this decade.”³⁶ Federated notes that the Spectrum Access System (SAS) will already have FSS earth station location data, since CBRS rules require both fixed and mobile

³⁵ Qualcomm, “5G Spectrum Sharing,” *available at* <https://www.qualcomm.com/invention/technologies/5gnr/spectrum-sharing>. Federated notes 3GPP has agreed on an accelerated schedule that will enable large-scale trials and deployments of 5G as early as 201. *See* Qualcomm, “3GPP Starts Study on 5G NR Spectrum Sharing” (Apr. 26, 2017), *available at* <https://www.qualcomm.com/news/onq/2017/04/26/3gpp-starts-study-5g-nr-spectrum-sharing>.

³⁶ Comments of Federated Wireless at 3.

users of the 3.5 GHz band to protect earth stations on both a co-channel and adjacent channel basis.³⁷

We further agree with CompTIA, which states that “flexible use licenses are key to ensuring the Commission does not preclude innovative uses of this spectrum. Its potential to be used for both fixed wireless and mobile make it an essential component for 5G.”³⁸ Similarly, Motorola Solutions suggests that “by using the general methods developed in the 3.55-3.7 GHz band, including the current base station and mobile device power level limits and judicious interference protection levels, . . . both [FSS and FS] can be adequately protected.”³⁹ And by restricting “mobile or portable devices . . . to [relatively] low power levels . . . there is greater probability that they will be operated in close proximity to their serving and controlling base station and, therefore, can be managed accordingly.”⁴⁰

Assuming that the Commission decides to ensure a path for mobile carrier use of the 3.7-4.2 GHz band, there are policy options that allow more intensive use immediately while not excluding either mobile or fixed uses longer-term. OTI & PK believe that the most promising path is to build on the existing Part 101 coordination process, allowing for a market-demand-driven coordination of either fixed or mobile deployments in localized areas. As noted above, the most valuable use of the band for mobile operators is to enhance network capacity in core urban and other high-traffic areas. It is therefore not necessary to ensure, in advance, exclusive access over very large or standardized geographic areas. In contrast, high-capacity fixed wireless

³⁷ *Id.* at 4 (“no modifications to the SAS-administered FSS protections in the CBRS are needed to extend a CBRS-like framework to 3.7-4.2 GHz”).

³⁸ Comments of the Computing and Technology Internet Association (CompTIA) at 2.

³⁹ Comments of Motorola Solutions Inc. at 2.

⁴⁰ *Id.*

broadband providers need to coordinate access to spectrum from access points located in rural, exurban and other low-population-density areas. If all operators are authorized to coordinate actual deployments of access points that cover relatively small areas, a geolocation database could coordinate their use either on different frequencies in the same area, or in different areas on the same frequency.

Moreover, as the BAC Petition proposes, fixed P2MP operators can be limited to coordinating (reserving) 40 megahertz at a time and for very short time periods (e.g., 60 days). Only when the operator has completed build-out on the initial 40 megahertz can it reserve and coordinate the next increment of 40 megahertz. If the Commission is concerned that even a band-wide operability requirement will not reserve sufficient spectrum in an area (e.g., urban core) for one service or the other, the FCC can adopt a condition limiting the overall share of the band that can be coordinated on a primary basis for a FS/P2MP deployments in a local area, for example, while reserving preferential access to later deployments for CMRS above that threshold. Any deployments above the threshold could be granted secondary status – and subject to a later directive from the coordination database that it move or reduce its reservation. These percentages (as well as allowable power limits) could also vary depending on the population density of the location (e.g., of that census tract).

Our groups do not claim at this point to know the precise parameters that will best balance the tension between the immediate benefits of expanding wireless broadband providers to coordinate shared access to this band and some longer-term opportunity to clear FSS incumbents off a portion of the band (e.g., 3.7-3.8 GHz) or even the entire band. We are confident, however, that progress on narrowing the high-capacity rural broadband gap, increasing affordable choices for home and business broadband users, and nurturing the most

diverse, robust and innovative version of a “5G” wireless ecosystem all depend on a forward-looking policy that opens this band soon and simply for fixed *and* mobile use.

D. A Strong Consensus Supports an Immediate Update of the IBFS Database, Including Information Needed to Promote Efficient Shared Use of the Band and to Protect Incumbent Users

There is a strong consensus in the record that FSS licensees operating in the 3.7-4.2 GHz band should be required to update the IBFS database as soon as feasible so that the Commission can determine which earth station licenses are still active and ensure their protection from interference.⁴¹ We strongly agree with Google that a “straightforward step toward more efficient use of the 3.7-4.2 GHz band ... should be improving the existing database of C-Band FSS sites.”⁴²

As a practical matter, expanding shared access to the band for terrestrial wireless operators (fixed or mobile) depends on updated, reliable and sufficient information about which earth station licenses should remain in effect, the accurate location of earth stations actually in operation, and the frequencies and orbital slots that are in actual use by each earth station. Without knowing the specific frequency band being used, and the direction in which the earth station is facing, terrestrial fixed operations must protect each and every FSS earth station across all 500 megahertz and in all possible directions toward the geostationary arc. This results in extraordinarily large areas where, for all intents and purposes, new deployments of terrestrial fixed services are precluded throughout the band.

Although it opposes either sharing or clearing FSS incumbents off the band, the Satellite Industry Association nevertheless agreed in its filing in response to the BAC Petition that “a

⁴¹ See, e.g., Nokia Comments at 6-8; Comments of Google at 2 and 4-7; Microsoft Comments at 3; UTC/Edison Electric Comments at 14 (the Commission should “ensure that FSS licensees update the information in the ULS database”); Comments of DSA at 8; Comments of BAC at 8-9.

⁴² Comments of Google at 5 (hereinafter “Google”). See also Comments of BAC at 8-9.

clean-up of the Commission’s International Bureau Filing System (“IBFS”) database containing earth station licensing and registration information is appropriate to ensure its ongoing accuracy and completeness.”⁴³ AT&T, although it similarly opposes a change to full-band, full-arc reservation, nevertheless agrees the Commission should conduct a “rigorous audit of C-band use.”⁴⁴ OTI & PK support SIA’s recommendation that the Commission offer “amnesty” to earth station operators that provide accurate information on a timely basis in a manner specified by the Commission.⁴⁵

An updating of IBFS will also benefit FSS incumbents by ensuring that *unregistered* earth stations are protected from harmful interference.⁴⁶ According to comments filed by the American Cable Association, “thousands” of receive-only earth stations have not registered with the Commission.⁴⁷ An update of the IBFS database should give unregistered earth stations a limited, yet reasonable, amount of time to register with IBFS or lose any guarantee of protection.⁴⁸

The Broadband Access Coalition further proposed that the licensees of active earth stations provide, on a one-time basis and when any future changes are made, limited additional

⁴³ Opposition of Satellite Industry Association, RM-11791, at 8 (filed Aug. 7, 2017) (hereinafter “SIA Opposition”).

⁴⁴ Comments of AT&T at 9.

⁴⁵ SIA Opposition at 8. *Accord* BAC Comments at 9.

⁴⁶ See, e.g., Comments of SIA at 18 - 19, 22 – 24; Comments of American Cable Association at 4, n.4; Comments of National Association of Broadcasters at 3-4.

⁴⁷ American Cable Assn. Comments at 2-3. “If the Commission allows wider use of the band, it should preserve the primary status of the Fixed-Satellite Service, establish concrete, immediate-response enforcement mechanisms to avert interference, and explore a streamlined system for the *thousands of unregistered stations to become registered*.” *Ibid* (emphasis added).

⁴⁸ Under Section 25.131(b) of the Commission’s Rules, if a receive-only earth station is not registered with IBFS, it is not entitled to interference protection.

information – specifically, the frequencies used and the orbital slot being accessed.⁴⁹ Earth station operators can readily provide such information, since it’s the basis for tuning their receivers to any particular satellite and transponder. The information will be highly valuable to the Commission as it reviews potential sharing of the 3700 – 4200 MHz band and to prospective terrestrial wireless operators as they review deployment opportunities in the 3700 – 4200 MHz band. Indeed, FSS earth station operators should affirmatively want to provide the information both to verify their extensive use of the band and, more critically, to ensure that the coordination process fully protects FSS operations from harmful interference in the future.

III. The Record Shows a Strong Consensus in Favor of an Unlicensed Underlay Across the Entire 6 GHz Band Subject to Non-Interference with Band Incumbents

OTI & PK strongly support the broad consensus among industry commenters that the Commission should expeditiously issue a NPRM to develop service and technical rules that authorize unlicensed broadband operations across the entire 6 GHz band (5925 to 7125 MHz). From a consumer perspective, Wi-Fi is an essential component of the nation’s wireless ecosystem as it enables faster, more ubiquitous and more affordable broadband connectivity. However, to keep pace with surging demand and high-bandwidth applications, Wi-Fi users will need access to wider channels and more spectrum overall so that this complement to mobile networks remains a pillar of the emerging 5G wireless ecosystem.

The breadth of the 6 GHz industry coalition that filed in support of extending unlicensed access, both indoors and outdoors, from 5925 MHz up to 7125 MHz, is a testament to the critical role that unlicensed technologies – and Wi-Fi in particular – plays in our economy and society

⁴⁹ BAC Petition at 25.

more generally.⁵⁰ Many other technology companies filed supporting comments separately.⁵¹ Support from these diverse parties – spanning the consumer equipment, semiconductor, internet media, rural broadband, enterprise wireless, software, and cloud services industries – demonstrates that more wide, contiguous channels of unlicensed spectrum is fuel for advances in connectivity and innovation that the Commission can should make available as quickly as the proponents can demonstrate that this additional use will not cause harmful interference to fixed point-to-point links, FSS or other incumbent services.

The 1200 MHz of contiguous 6 GHz spectrum between 5925 and 6425 MHz is uniquely well-suited for unlicensed. This spectrum could support up to seven 160 MHz gigabit Wi-Fi channels, significantly increasing the total number of available wide- bandwidth channels.”⁵² This additional capacity will be critical to the America’s wireless future. It is well documented that unlicensed technologies generate hundreds of billions of dollars each year in consumer welfare, even if much of it (e.g., Wi-Fi offload and the ability for many consumers to share a single internet connection) is not monetized.⁵³ As the 6 GHz Coalition correctly point out, the

⁵⁰ Comments of All Points Broadband, Amplex Internet, Apple, Blaze Broadband, Broadcom, Cambium Networks, Cisco Systems, Cypress Semiconductor, Dell, Extreme Networks, Facebook, Fire2Wire, Google, Hewlett-Packard Enterprise, HP, Intel, Joink, MediaTek, Metalink Technologies, Microsoft, New Wave Net, Pixius Communications, Qualcomm, Rise Broadband, Ruckus, A Unit of Brocade, Snappy Internet, Sony Electronics, Western Broadband, Wireless Internet Service Provider Association, Wisper ISP at 5 (hereinafter “6 GHz Coalition”).

⁵¹ See, e.g., Comments of Dynamic Spectrum Alliance at 10-19; Comments Hewlett Packard at 8; Comments of Vivint at 4; Comments of Broadcom at 9; Comments of Qualcomm at 6; Comments of Microsoft at 9; Comments of Wi-Fi Alliance at 3; Comments of Google at 12-13.

⁵² Comments of National Cable & Telecommunications Assn. at 5-10 (hereinafter “NCTA”).

⁵³ See, e.g., Paul Milgrom, Jonathan Levin, and Assaf Eilat, *The Case for Unlicensed Spectrum* (Oct. 2011), at p. 19 (“Milgrom Study”) (estimating the economic value of mobile data traffic offload carried by Wi-Fi to be at least \$25 billion annually), available at <http://web.stanford.edu/~jdlevin/Papers/UnlicensedSpectrum.pdf>; Raul Katz, *Assessment of the Economic*

540 MHz of unlicensed spectrum currently available in the 2.4 GHz and 5 GHz unlicensed bands “carry more internet data than any other wireless technology or service, with usage expected to continue increasing at a rapid pace.”⁵⁴

An expedited proceeding to extend unlicensed use into the 6 GHz band (above 5925 MHz) is particularly important because of the shortage of contiguous unlicensed spectrum to support the current IEEE 802.11ac and pending 802.11ax Wi-Fi standards that are capable of delivering gigabit connectivity and lower latency in a very cost-effective manner. OTI & PK agree with the 6 GHz Coalition that both studies and the Commission itself have recognized there is a shortage of unlicensed spectrum expected to be as much as 500 megahertz by 2025.⁵⁵ Vast amounts of unlicensed spectrum will be needed for more than Wi-Fi, as tens of billions of devices are connected through a web of IoT applications and networks. Open wireless strategies (Wi-Fi and other unlicensed technologies) are already dominant in a number of industries that are rapidly incorporating wireless connectivity, making up 70 percent of smart grid

Value of Unlicensed Spectrum in the United States, Telecom Advisory Services (Feb. 2015), at p. 14, available at: <http://www.wififorward.org/wp-content/uploads/2014/01/Value-of-Unlicensed-Spectrum-to-the-US-Economy-Full-Report.pdf>.

⁵⁴ Comments of 6 GHz Coalition at 5, citing Cisco, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2016– 2021, 21–22 & fig. 23 (2017), <https://www.cisco.com/c/en/us/solutions/collateral/serviceprovider/visual-networking-index-vni/mobile-white-paper-c11-520862.pdf>.

⁵⁵ See Steve Methley & William Webb, Quotient Assocs. Ltd., Wi-Fi Spectrum Needs Study 29 (Feb. 2017) (“[B]etween 500 MHz and 1 GHz of new spectrum will be needed in 2025 to satisfy the anticipated busy hour.”); Rolf de Vegt et al., Qualcomm Techs., Inc., A Quantification of 5 GHz Unlicensed Band Spectrum Needs 5 (2017). See also Commissioner Michael O’Rielly, A Mid-Band Spectrum Win in the Making, FCC Blog (July 10, 2017, 2:30 PM), <https://www.fcc.gov/news-events/blog/2017/07/10/mid-band-spectrum-win-making> (“Study after study has shown that the U.S. is going to need multiple gigahertz of licensed and unlicensed spectrum just to keep up with current growth patterns”); Commissioner Jessica Rosenworcel, Bringing the Connected Future to All Americans, May 11, 2012–January 3, 2017, FCC Blog (Dec. 30, 2016, 5:30 PM), <https://www.fcc.gov/news-events/blog/2016/12/30/bringing-connectedfuture-all-americans-may-11-2012-%E2%80%93-january-3-2017> (“Moreover, as any wireless user can attest to, the airwaves used for Wi-Fi today are getting crowded—putting a premium on identifying additional spectrum for unlicensed growth.”).

communications, 80 percent of wireless healthcare solutions, over 90 percent of wireless tablet connectivity, nearly all RFID inventory and asset tracking, as well as a growing share of the emerging Internet of Things.⁵⁶

OTI & PK further agree with the 6 GHz Coalition that in the two largest band segments between 5925-7125 (which the Coalition describes as the U-NII-5 and U-NII-7 bands, which extends 900 megahertz from 5925-6875, with the exception of 6425-6525), “the FS and FSS uplink incumbents present, in virtually every respect, simpler coordination and interference prevention challenges than other bands where the Commission has already authorized unlicensed devices.”⁵⁷ Our groups recommend that even if a database management mechanism is necessary to ensure the protection of band incumbents by unlicensed operations outdoors, that the Commission will bifurcate the NPRM to more quickly authorize the use of Part 15 Wi-Fi and other low-power unlicensed technologies indoors, which can be safeguarded with an AC power requirement if needed.

OTI & PK also agree with NCTA which, although it represents cable companies that rely greatly on the uplink C-Band for program distribution to cable head ends, states: “Not only did the Commission choose the right time to explore new unlicensed bands, it correctly identified 6 GHz as a promising candidate, provided that studies demonstrate that unlicensed users can protect incumbent operations.”⁵⁸ Charter also argues that the 6 GHz band would be “particularly well suited for unlicensed use in order to further expand the success of Wi-Fi.”⁵⁹ While it may

⁵⁶ Yochai Benkler, Open Wireless vs. Licensed Spectrum: Evidence from Market Adoption, 26 HARV. J. L. & TECH. 1 (Fall 2012) (“*Benkler Study*”), at p. 72.

⁵⁷ Comments of 6 GHz Coalition at 11.

⁵⁸ Comments of NCTA at 5-10.

⁵⁹ Charter Comments at 3.

be necessary for the Commission to monitor the possibility that a general rise in the noise floor could impact FSS earth stations, the agency can handle this as it did the parallel concern that arose in relation to authorizing outdoor unlicensed operations under Part 15 in the U-NII-1 band.

Opening up the 6 GHz band for unlicensed use would enable innovators to quickly make that spectrum usable for Wi-Fi thanks to its close proximity to the 5 GHz band, as well as due to the similar propagation characteristics between the 6 GHz band and the 5 GHz band.⁶⁰ These similarities mean that chipmakers (as Broadcom notes) can move quickly to make 6 GHz chips to for Wi-Fi use.⁶¹ Google and Alphabet Access similarly argue that the proximity of the 6 GHz band to the 5 GHz U-NII band presents a “unique opportunity to expand the amount of available spectrum for unlicensed devices and services.”⁶²

As the 6 GHz Coalition and other commenters correctly emphasize, unlicensed spectrum below 6 GHz already carry more internet data than any other wireless technology or service, with demand for best efforts (and hence affordable) connectivity expected to continue rising at a rapid rate.⁶³ We agree with the 6 GHz Coalition argues that it is “critical that the Commission act swiftly to expand opportunities for unlicensed use in the 6 GHz band” since unlicensed technologies are also “a critical part of a successful transition to the 5G era.”⁶⁴ Our groups also agree with Microsoft that “permitting unlicensed operations in the 6 GHz band is critical to

⁶⁰ Broadcom Comments at 9.

⁶¹ *Id.* (“Most importantly, Wi-Fi throughout the 6 GHz band could be integrated into unified 5/6 GHz chipsets, much as Broadcom and other manufacturers today integrate U- NII-1 and U-NII-3 capabilities. This would quickly allow unlicensed 6 GHz chipset manufacturers to leverage the massive economies of scale that characterize the 5 GHz Wi-Fi ecosystem, and which keep costs very low for both operators and consumers.”).

⁶² Google and Alphabet Access Comments at 12.

⁶³ Comments of 6 GHz Coalition at 7-9.

⁶⁴ *Id.* at 9.

meeting growing demand for Wi-Fi, driving innovation and investment, and preserving U.S. leadership” in wireless and broadband technologies.⁶⁵

⁶⁵ Microsoft Comments at 10.

IV. Conclusion

OTI & PK urge the Commission to expeditiously issue an NPRM to authorize the deployment of high-capacity, P2MP fixed wireless broadband services in the 4 GHz Band and a separate NPRM to authorize an unlicensed underlay across the entire 6 GHz band (5925 – 7125 GHz). In 3.7-4.2 GHz band, the rapid deployment of high-capacity P2MP access points will help to address the digital divide by enabling more affordable, near-gigabit fixed wireless broadband service to rural and other underserved areas, as well as more competition in other areas where consumers have little if a choice among fixed broadband providers. The current Part 101 coordination process can immediately allow both fixed and mobile terrestrial wireless deployments on fallow C-Band spectrum in local areas, particularly since mobile operators will be focused on enhancing capacity in targeted (mostly) urban and high-traffic areas, while fixed P2MP providers will be focused on rural and other less densely populated areas.

In addition, the extension of wide-channel, unlicensed access up into the 6 GHz band – and, on a contiguous basis, up to 7125 MHz – will help ensure that Wi-Fi and other technologies have the spectrum needed to diversify and enrich the emerging 5G wireless ecosystem in a manner that is accessible and more affordable to every home and business.

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